

CLAIMS

1. Linear perfluoropolyethers having the following structure formula:



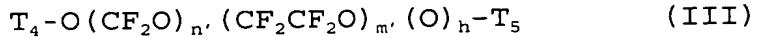
wherein:

- T and T_1 , equal to or different from each other are selected from CF_3- , CF_3CF_2- , C_3F_7- , C_4F_9- , $ClCF_2-$, $ClCF_2CF_2-$;
- n , m , r , s are integers such that the number average molecular weight is comprised between 700 and 100,000, preferably between 1,500 and 20,000;
- the m/n ratio is comprised between 2 and 20, preferably between 2 and 10;
- the $(r+s)/(n+m+r+s)$ ratio is comprised between 0.05 and 0.2, preferably between 0.07 and 0.2;
- the $n/(n+m+r+s)$ ratio ranges from 0.05 to 0.40, preferably from 0.1 to 0.3;

wherein the perfluorooxyalkylene units are statistically distributed along the polymeric chain.

2. Perfluoropolyethers according to claim 1, wherein the number average molecular weight is in the range 1,500 - 20,000 (viscosity between 10 cSt and 1,000 cSt at 20°C).
3. Perfluoropolyethers according to claims 1-2 additioned with thermal stabilizers of perfluoropolyethers.

4. Perfluoropolyethers according to claim 3, wherein the thermal stabilizers are selected from perfluoropolyethers having functionality of the phosphines, phosphates, phosphazenes, benzothiazoles, triazines, amines, substituted amines type, nitroderivative compounds
5. Perfluoropolyethers according to claims 1-4, wherein T and T₁, besides the indicated meanings, are also -(CF₂)_zCOF wherein z = 0, 1, 2, 3, and wherein the total moles of the end groups comprise from 0.5% by moles to 50% by moles of -COF groups.
6. Perfluoropolyethers according to claims 1-5, wherein the COF end groups are transformed into other functional groups.
7. Perfluoropolyethers according to claim 6, wherein the functional end groups are selected from COOH, COOR (with R=CH₃, C₂H₅, C₃H₇), aminic, alcoholic, aldehydic, salts, nitrilic, amidic functional groups.
8. A process for the preparation of the formula (I) perfluoropolyethers according to claim 1 comprising the following steps:
 - a) preparation of the compound of claim 5 by addition, under stirring, of the formula (III) peroxidic compound:



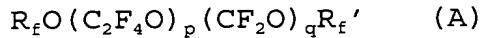
wherein T_4 , T_5 , equal to or different from each other, are selected from CF_3- , CF_3CF_2- , $-COF$, $-CF_2C-OF$, XCF_2- , XCF_2CF_2- wherein $X = Cl$, $-OR''_f$ wherein R''_f is a C_1-C_3 perfluoroalkyl, having a $n'/(n'+m')$ ratio from 0.05 to 0.25 and a $h/(n'+m')$ ratio from 0.1 to 0.3 and a PO (peroxidic content) content, defined as grams of active oxygen/100 grams of compound, from 1.8 to 4, preferably from 2 to 3.8, to a reaction medium formed by a perfluoropolyether oil, contained in a reactor, maintained at a constant temperature in the range $150^{\circ}C-250^{\circ}C$, preferably $230-250^{\circ}C$, so as to have a PO of the reaction mixture between 0 and 0.5, preferably between 0 and 0.2, by continuously extracting the reaction mixture and heating the collected fractions not containing the initial perfluoropolyether oil at temperatures comprised between 220 and $250^{\circ}C$ until complete removal of the residual peroxidic groups, obtaining the claim 5 compound;

b) fluorination of the compound obtained in a) with the obtainment of the formula (I) compound.

9. A process according to claim 8, wherein the step a) is carried out by using as reaction medium, instead of a

perfluoropolyether oil, the perfluoropolyether of claim 5.

10. A process according to claims 8-9, wherein in step a) the compound (III) is added to the preheated reaction medium, with a flow-rate comprised between 0.1 and 1.3 kg/h per Kg of reaction medium.
11. A process according to claims 8-10, wherein after step b) the compound (I) is subjected to molecular distillation to separate fractions having a different molecular weight.
12. A process according to claims 8-11, wherein the perfluoropolyether oil to be used in the preparation of the compounds of formula (I) and of claim 5 is a perfluoropolyether of formula (A)



with R_f and R_f' equal to or different from each other selected from CF_3- , C_2F_5- , $ClCF_2-$, $ClCF_2CF_2-$; p and q are variable indexes, whose sum gives the number average molecular weight and whose p/q ratio ranges from 0.1 to 10.

13. Use of the perfluoropolyethers of claims 1-4 as lubricants.
14. Use of the perfluoropolyethers of claims 5-7 to confer hydro- and oil-repellence to surfaces.